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(58) Field of search
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(54) Wireless remote control transmitter and receiver for electrical appliances

(57) To reduce the number of remote control transmitters required to control multiple domestic electrical appliances, the transmitter and the receiver establish a temporary communication link by going through a certain identification procedure. As long as the communication link still exists, subsequent signal sent by the transmitter will be interpreted by this receiver alone. Therefore, one transmitter is able to communicate with many receivers, thus in turn to operate many appliances. In the identification procedure, identity codes are sent by the transmitter 1. The receiver turns on a visual device 7 as soon as its identity code is received. This visual signal is relayed to the transmitter through mechanical action actuated by the human. The transmitter will stop sending identity codes and ends the identification procedure.

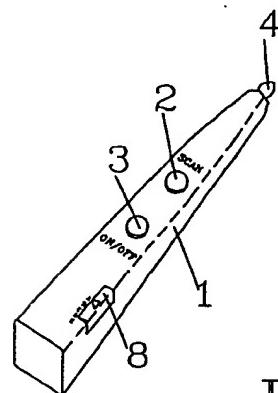
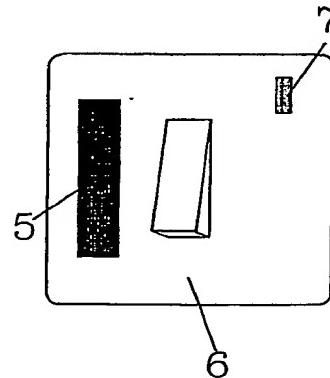


Fig. 1

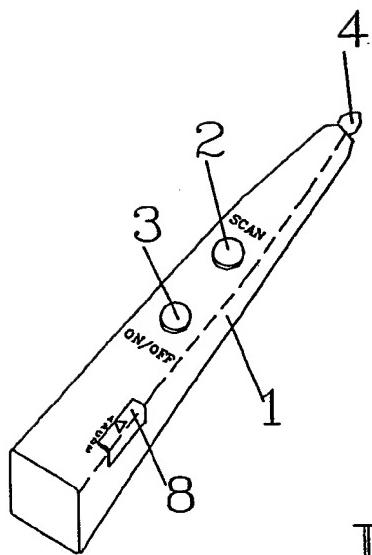
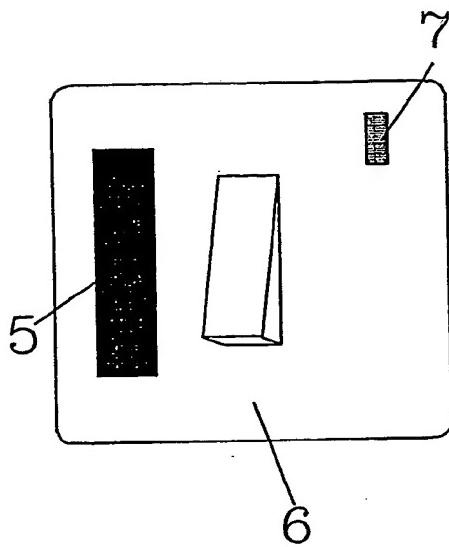


Fig. 1

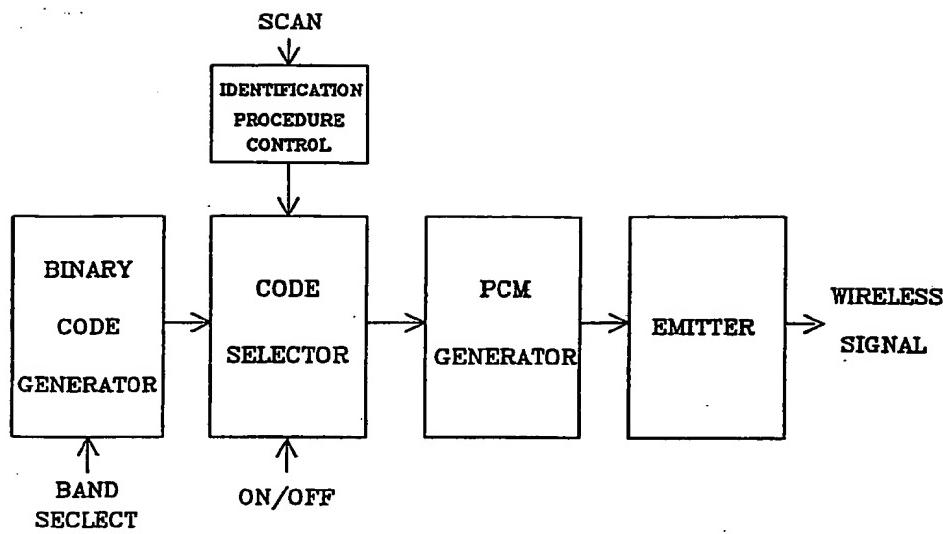


Fig. 2

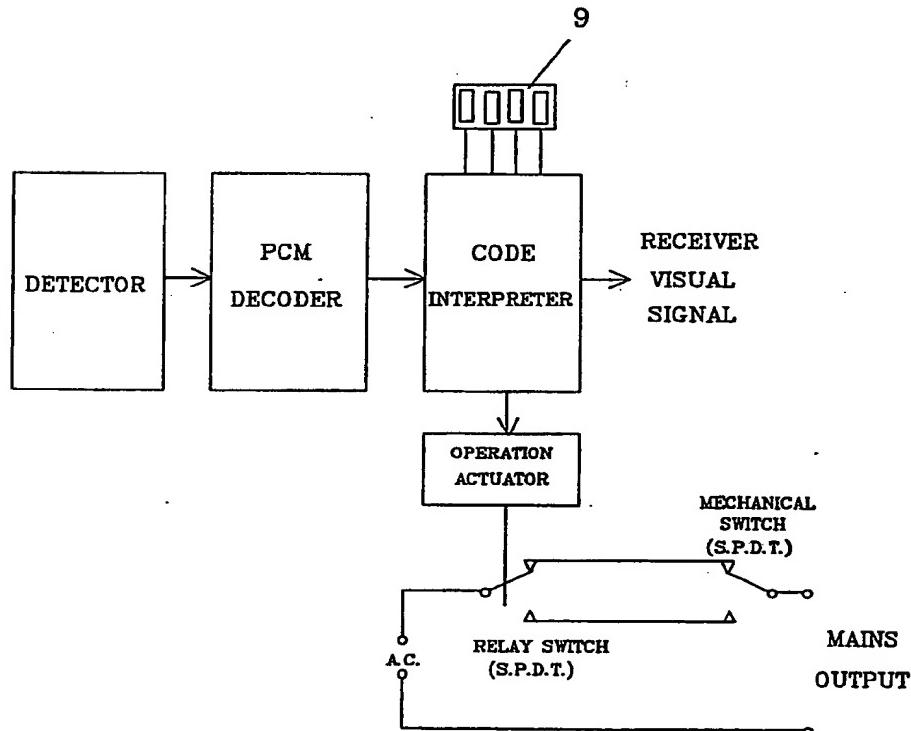


Fig. 3

[Wireless Remote Control Transmitter and Receiver for Electrical Appliances]

The invention concerns a transmitter and a receiver. The transmitter communicates with the receiver through one of several possible means, namely, infra-red, ultra-sound, low-power laser and low-power short-range radio wave, to remotely control an electrical appliance. The transmitter establishes a temporary communication link with the receiver by going through a special identification procedure. The identification procedure thus allows the transmitter to single out one of any electrical appliances fitted with the receiver for subsequent operation even there are others in close physical proximity.

Wireless remote control is very common in operating electrical appliances, for example, mains switch, lighting, television, hi-fi, air-conditioner etc.. Each appliance is typically controlled by a dedicated transmitter which is not able to control other appliances. The dedicated transmitter sends a pulse-code-modulation (PCM) signal and a receiver in the appliance interprets the signal and operates the appliance accordingly.

The PCM signal is either infra-red, ultra-sound, low-power laser or low-power short-range radio wave. They are suitable for controlling appliances within an enclosure such as a room, or within the line-of-sight. Because of their non-penetration and limited range characteristics, other appliances out of the enclosure or range will not be unintentionally affected.

A dedicated transmitter usually has several keys (push-buttons). Each key if pressed will make the transmitter sending out a specific PCM signal for an operation in the corresponding electrical appliance. The number of keys depends on the number of different operations required in the appliance. For mains switch and lighting, one key may be sufficient to turn the appliance on and off. For more sophisticated appliances, such as audio-visual equipment, many more keys will be necessary.

Wireless remote control has become a way of life and even a necessity in operating electrical appliances in many households. Because a transmitter is dedicated only to one specific appliance, many different transmitters will be required. This is obviously inconvenient and a nuisance.

The obvious way to reduce the number of transmitters is to integrate several different transmitters into a single unit. The unit will have the same number of keys as all the keys on the different transmitters added together. For mains switch and lighting, such an integrated transmitter will have several keys, each of which is dedicated to a specific switch or lighting. User operating the integrated transmitter has to know which key corresponds to which switch or lighting. For audio-visual equipment, an integrated transmitter will have to be large in order to house all the tens of keys required. In conclusion, the integration approach will make the transmitter either too troublesome to use or too bulky to handle.

The problems of the integration approach are solved by the wireless remote control transmitter and receiver of the invention. The receiver carries out an operation request from the transmitter only after a special identification procedure. In the identification procedure, the receiver will respond to an identity code sent by the transmitter. Once this identity code is received, the receiver signals back the transmitter via human action. The receiver signal will be visibly recognisable, visible light for instance, by the human. The human, in turn, notifies the transmitter through mechanical means, such as releasing a pressed key. Subsequently, the transmitter stops sending identity codes and ends the identification procedure. The identification procedure, therefore, allows the same transmitter to communicate with many receivers; the receivers, of course, will have different identity codes if they are in the same enclosure or range. Once the transmitter establishes a temporary communication link with a specific receiver, further signals from the transmitter will be interpreted by that receiver alone. The communication link will be terminated either by the transmitter or after a set period of time. This is necessary so that the transmitter can establish communication link with other receiver without worrying that the previously established communication link still exists.

The advantages offered by the invention are three folds. First, one transmitter is used to communicate with many receivers, thus in turn to operate many appliances. Second, although each receiver is assigned a specific identity code, the code is "transparent" to users because of the design of the identification procedure. Third, involving human action in returning signal from the receiver to the transmitter reduces the electronic hardware requirement in both of them. The result is a convenient size, easy to use and cheap to implement wireless remote control.

Fig. 1 shows an example of applying the invention in operating a mains switch. The transmitter 1 has two keys, 2 and 3. Key 2, if pressed, initiates the transmission of identity codes from the infra-red emitter 4. The receiver 5 on the mains switch 6, once detects its identity code, turns on the LED 7. A user operating the transmitter should immediately release key 2 in response. LED 7 will be on for a very short period of time determined by the time interval between identity codes received. Subsequently, the transmitter 1 stops sending identity codes and ends the identification procedure. Within a set period of time afterwards, between five to ten seconds, pressing key 3 will turn the mains switch on and off.

Fig. 2 shows the functional block diagram of transmitter 1. Whenever SCAN is active which is effected by pressing key 2, the transmitter will send out identity codes in sequence. Time interval between identity codes should be neither too short nor too long. Too short will allow too little time for the user to respond, whereas too long will lengthen the time to complete the identification procedure. It is estimated that a time interval of one quarter of a second to one second will be acceptable. The time to complete the identification procedure will still be too long if there are many identity codes to be sent. This will be the case if the transmitter is required to control a lot of appliances within an enclosure. To shorten the completion time, identity codes can be divided into bands; each band corresponds to one type of appliances. This facility is included in transmitter 1. The band select 8 should be set according to the appliance type before the identification procedure.

Fig. 3 shows the functional block diagram of receiver 5. The dip switch 9 is used to set the identity code for the receiver. After the identification procedure, the operation actuator will changeover the position of the Single-Pole-Double-Throw relay whenever the ON/OFF code is received. The wiring shown between the relay and the mechanical switch allows the mechanical switch also to control the mains output.

Claims

1. Wireless remote control transmitter and receiver for electrical appliances, communicates through wireless signals, such as infra-red, ultra-sound, low-power laser and low-power short-range radio wave. The transmitter establishes a temporary communication link with the receiver by going through a special identification procedure which involves human action. In the identification procedure, identity codes are sent from the transmitter. The receiver turns on a visual device as soon as its identity code is received. A user operating the transmitter will respond to this visual signal by signaling the transmitter through mechanical means, releasing a pressed key for instance. The transmitter will stop sending identity codes and ends the identification procedure. As long as the temporary communication link still exists, subsequent codes sent by the transmitter will be interpreted by this receiver alone. The communication link will be terminated by the beginning of another identification procedure, or after a set period of time, between five to ten seconds.
2. The time interval between two different identity codes sent by the transmitter is set between one quarter of a second to one second.
3. The identity codes can be divided into bands, with each band corresponding to one type of appliances, to shorten the time to complete the identification procedure.

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

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Relevant Technical fields

(i) UK CI (Edition K) G4H (HRE)

(ii) Int CI (Edition 5) GO8C

Search Examiner

M J DAVIS

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

18 NOVEMBER 1991

Documents considered relevant following a search in respect of claims 1-3

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2188458 A (RCA), Whole document	

Category	Identity of document and relevant passages	Relevance to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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